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DATE:

12/05/01

TO:

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Bill Melville

ORGANIZATION:

EPA Region 4

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FROM:

NAME:

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NUMBER OF PAGES TO FOLLOW:

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DE: 2001

December 3, 2001

Mr. Chris Johnson  
Alabama Department of Environmental Management  
Water Division  
1400 Coliseum Boulevard  
Montgomery, Alabama 36110

Re: Treatment Technology and Cost Information

Dear Mr. Johnson:

Enclosed you will find information pertaining to the ADEM November 7, 2001 request for treatment technologies and cost information. The financial data for Walter Industries is public information, however, the Sloss Industries financial data is not. Please handle this portion of the data package as *Confidential Business Information*.

If you have any questions, please contact Mr. Mike Griffin at 205-808-7839.

Sincerely,

Charles A. Jones  
General Manager, Chemical Division

cc: J.P. Martin, M. Griffin, and P. Reed

## MEMORANDUM

CH2MHILL

## Sloss Industries Alternatives Review

TO: Sloss Industries

FROM: CH2M HILL

DATE: November 30, 2001

### Background

Sloss Industries discharges treated process-related wastewater and storm water to Five Mile Creek under National Pollutant Discharge Elimination System (NPDES) permit number AL0003247. Currently, Five Mile Creek is classified under Alabama Water Quality Standard 335-6-11 as an Agricultural and Industrial (A&I) water supply. The Alabama Department of Environmental Management (ADEM) is considering upgrading Five Mile Creek to the Fish and Wildlife (F&W) classification or the Limited Warmwater Fisheries (LWF) classification. Should this occur, Sloss Industries will be forced to upgrade its wastewater facilities to meet the more stringent limits, which would be required under either classification.

### Projected Effluent Limits

If Five Mile Creek is upgraded, Sloss' NPDES permit would include more stringent effluent limits. ADEM has also proposed more stringent effluent limits for permit renewal under the A&I stream classification. Parameters that have the potential to exceed the current effluent limitations are listed below:

TABLE 1 - ESTIMATED SLOSS INDUSTRIES NPDES LIMITS FOR VARIOUS STREAM CLASSIFICATIONS								
Parameter	Existing Limits		A&I Limits		LWF Limits		F&W Limits	
	Dec-Apr	May-Nov	Dec-Apr	May-Nov	Dec-Apr	May-Nov	Dec-Apr	May-Nov
Daily Max CBOD5	None	none	425	353	424	353	424	240
Monthly Avg CBOD5	None	none	283	236	283	236	283	160
Daily Max NH3-N	12 mg/L	12 mg/L	212	85	212	85	212	67.5
Monthly Avg NH3-N	None	none	141	57	141	57	141	45

**TABLE 1 - ESTIMATED SLOSS INDUSTRIES NPDES LIMITS FOR VARIOUS STREAM CLASSIFICATIONS**

Parameter	Existing Limits		A&I Limits		LWF Limits		F&W Limits	
	Dec-Apr	May-Nov	Dec-Apr	May-Nov	Dec-Apr	May-Nov	Dec-Apr	May-Nov
Daily Max TKN	None	none	423	170	424	170	424	135
Monthly Avg TKN	None	none	282	111	283	111	283	90
Daily Max CN	1.120		2.078		1.038		1.038	
Monthly Avg CN	none		1.039		0.246		0.0246	
Daily Max Benzo(a)pyrene	0.026		0.022		0.022		0.022	
Monthly Avg Benzo(a)pyrene	none		0.011		0.011		0.011	
Daily Max TSS	4000		1635		1635		1635	
Monthly Avg TSS	1200		994		994		994	
Acute Toxicity, %IWC	46%		79%		79%		79%	
Chronic Toxicity, %IWC	n/a		n/a		69%		79%	

1. All parameters are lb/day unless noted.

2. CBOD5, NH3-N, and TKN limits are estimated based on ADEM water quality model, revised by CH2M HILL.

The objective of this preliminary alternatives assessment is to assess alternatives to the present outfall location and wastewater treatment units that will allow Sloss to meet NPDES permit conditions should the stream remain as A&I, or be upgraded to LWF or F&W. The alternatives presented below were defined by ADEM in preliminary discussions regarding feasible alternatives to meet new water quality-based permit limits.

## Land Application of Treated Effluent

Land application of treated effluent typically is evaluated as an alternative to surface water discharges when insufficient surface water is available for assimilation of the treated wastewater. Although adequate surface water is available, this alternative was evaluated and was deemed a non-viable alternative. This alternative is not technically viable for a variety of reasons:

- Land application is typically accomplished on land, which is gently sloped, to allow infiltration of wastewater into the subsurface. The hilly terrain in the vicinity of Sloss is not conducive to land application.
- In addition to the sloping issues, the shallow bedrock in the vicinity of Birmingham will likewise not allow infiltration to readily occur.

## **Pretreatment/Discharge to Publicly Owned Treatment Plant (POTW)**

Sloss has considered the possibility of discharging to the local POTW, the Jefferson County Five Mile Creek Wastewater Treatment Plant (WWTP). Jefferson County has stated that an indirect discharge from Sloss would be regulated according to the County's pretreatment program, and has stated that they are not amenable to connection of the Sloss effluent to the County system. The County has an upfront connection fee based on flow, and then charges monthly user fees based on discharge volume and wastewater concentrations. Estimated connection fees are \$1,400,000 for outfall 001b (0.5 mgd), and \$18,300,000 for outfall 001 (5.8 mgd). Estimated annual user fees would be approximately \$400,000 for outfall 001b and \$5,100,000 for outfall 001. Additional capital and operating costs would be required for effluent conveyance to the Jefferson County collection system. The capacity of the Jefferson County system to accept a low strength wastewater with a flow of almost 6 mgd is unknown, but it is highly unlikely that this capacity exists. Capital improvements to the Sloss biological treatment facility (BTF) would be required to comply with the County's cyanide pretreatment limit. Based on connection and discharge fees, uncertainties about the available POTW capacity, and Jefferson County's stated objections to accepting Sloss' wastewater, discharge to the POTW is not considered to be feasible for Sloss.

## **Outfall Relocation**

Five Mile Creek is the only receiving stream in the vicinity of Sloss Industries. Streams with larger flows are located across ridges in other drainage basins, or approximately 34 miles downstream of Sloss at the Black Warrior River. Therefore, relocating the Sloss outfall to a larger receiving stream is not feasible.

## **Process and End-of-Pipe Treatment Upgrade Alternatives**

Depending on the final stream classification, Sloss will require additional wastewater treatment to meet more stringent NPDES permit limits. Comparing Sloss' current limits to the limits estimated in Table 1 show several parameters that could exceed the revised NPDES limits. Meeting these limits will require additional treatment at the Sloss facility.

### **A&I Limits**

Compliance with the proposed A&I limits will require WWTP modifications to improve cyanide and benzo(a)pyrene removal in the biological treatment facility (001b), and additional best management practices (BMPs) to control nitrogen and solids loads to the

effluent polishing pond. The polishing pond (001) provides a high quality effluent with typical values including CBOD<sub>5</sub> <5 mg/L and TSS < 15 mg/L.

Proposed biological treatment facility upgrades include adding mixers to the aeration basins to reduce heat loss during cold weather operations, cyanide precipitation as Prussian Blue using ferrous sulfate, and effluent media filtration. Effluent filtration will remove cyanide precipitate. Filtration is also expected to reduce effluent benzo(a)pyrene concentrations, since it has a low solubility (0.003 mg/L) in water. Additional BMPs will be implemented in the coke and chemical plant to reduce the potential for spills or storm water runoff from areas handling organic and nitrogen bearing streams. Elevated solids and nitrogen levels in the polishing pond are infrequent and appear to be related to spills, storm events, area cleanups, and other non-routine activities.

### LWF Limits

Compliance with the proposed LWF limits will require the WWTP modifications proposed for the A&I limits, plus effluent polishing to comply with the chronic toxicity limit. One of the primary concerns is the potential Instream Waste Concentration (IWC) for the Chronic Toxicity Biomonitoring. Sloss will not be in compliance with a 69% IWC without significant treatment addition. Sloss is currently providing a high degree of treatment to its wastewater, and produces low levels of BOD<sub>5</sub> and nitrogen in the effluent; however, it is likely that meeting the effluent toxicity limits under an LWF classification would require removal of dissolved solids in the effluent. Prior to this process, ultrafiltration will be needed to remove solids and materials, which would clog the TDS removal process.

The major processes used to remove dissolved solids include reverse osmosis, electrodialysis, distillation, and ion exchange. Of these processes, reverse osmosis is the most cost-effective process for removal of dissolved solids. Thus, reverse osmosis, along with ultrafiltration, would be the major processes required. This process would include the following equipment:

- Low Pressure Booster Pumps
- Acid/Caustic Feed System
- Scale Inhibitor Feed System
- Cartridge Filter
- Cleaning System
- High Pressure Feed Pumps
- Ultrafiltration Membranes
- Reverse Osmosis Membranes
- Miscellaneous Piping
- Electrical and Instrumentation System

In addition, a significant cost associated with removal of the dissolved solids is the need to dispose of the waste brine solution from the RO unit. This solution is assumed to be discharged to the Jefferson County POTW under an in-direct discharge permit, and is subject to negotiation with the County. Brine would have to be sent to an offsite, commercial treatment system if the County will not accept the waste stream, and costs for this option will increase.

**F&W Limits**

Compliance with the proposed F&W limits will require the WWTP modifications proposed for the A&I limits, plus effluent polishing proposed for the LWF limits to comply with the chronic toxicity limit. Aeration system upgrades in the BTF to improve nitrogen removal are also provided for this alternative. One of the primary concerns is the potential IWC for the Chronic Toxicity Biomonitoring. Sloss will not be in compliance with a 79% IWC without significant treatment additions.

Replacing the existing mechanical surface aerators with a diffused aeration system is proposed to reduce aeration basin heat loss during winter months. Aeration basin temperatures can drop to 45° F or lower during periods of cold weather. These low temperatures result in reduced ammonia and BOD<sub>5</sub> removal rates in the BTF. Converting the aeration basins to a diffused aeration system would increase the winter basin temperatures by 10 to 15° F, and would provide improved BTF performance.

**Estimated Capital and Operating Costs**

Table 2 presents the estimated capital and operating costs for the WWTP modifications associated with the three potential stream classifications. These rough order-of-magnitude (ROM) cost estimates have been prepared to assess the economic viability of the treatment alternative and to allow relative comparison of alternative treatment processes. Costs are based on cost curves and historical project cost information. The actual project costs will vary from these estimates, and will depend on actual labor and material costs, competitive market conditions, final project scope, schedule, and other variables.

**TABLE 2 – ESTIMATED CAPITAL AND ANNUAL OPERATING COSTS**

<b>Stream Classification</b>	<b>Capital &amp; Construction</b>	<b>Annual O&amp;M</b>
Agricultural & Industrial	\$2,810,000	\$400,000
Limited Warmwater Fisheries	\$18,900,000	\$5,090,000
Fish & Wildlife	\$20,000,000	\$5,140,000